Hyperparasitism by a Minute Fly and the Specific Description of a New Species

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(Field Work by Clifford Beauglehole.)

(Plate xxxix)

A new series of nests of the wasp *Sericophorus victoriensis* Raym. was investigated in the Mount Richmond Reserve, Victoria, on the 17th February, 1956, by Clifford Beauglehole, a member of the Portland Field Naturalists Club, and an indefatigable student of the biota of his district. The observations confirm those of the senior author made in 1935.

The new locality is alongside Telegraph Road, on the N.E. slope of Mt. Richmond. Since the land forms portion of a proposed flora reserve, it is heavily timbered, with a large number of native shrubs, thus ensuring an abundance of wild-flowers.

The Myrtle Family is, of course, well represented, and tea-trees are numerous, especially *Leptospermum juniperinum,* so that a plentiful supply of food for the adult wasps is assured. Indeed, this is a late-flowering species, and the observer's patience was rewarded by seeing a *Sericophorus* female feeding on the nectar of the blossoms.

Later on, Clifford Beauglehole was again fortunate in discovering many shafts of these wasps excavated on the side of the road leading west of Mt. Gambier, in South Australia. It was a busy thoroughfare at that season, and the dense automobile traffic precluded any successful investigation of the shafts. A week or so later the surface was bull-dozed, and then received a thick dressing of crushed limestone.

While the avalanche of loose stone was almost disastrous for the wasps, yet it was not an unmitigated evil, for it restrained the motorists and caused them to seek a deviation, thus leaving the coast clear once more for the naturalist to continue his observations on a colony of about eight sericophorine shafts engaged in moderate activity.

On the 19th February, 1956, Beauglehole observed several small nyssonid wasps emerge from the shafts and then apparently disappear. However, on investigating another larger sericophorine colony containing some 20 or more shafts, he saw the parasites again reconnoitring the pit-mouths. These small wasps proved to be *Nysson portlandensis* Raym., and the observer confirmed the senior author's account which was published, with a plate, in the Victorian Naturalist, November, pp. 123-127, 1953.

By 11 a.m. on the same date the sericophorines were already busy with their hunting, but this habit is, of course, in strong contrast to that of *S. teliferopodus* Raym., which hunts her golden-haired blowflies soon after dawn, sometimes as early as 4.45 a.m. The prey of the Mt. Richmond species is a black, bristly fly of medium size. Needless to add, all the dipterons were males. The activities of the sericophorine colony had practically ceased by the end of March, when only one wasp was observed excavating a shaft.

The nyssonids loaf about the doorways of the wasps, but usually keep out of sight behind the tumulus of loose sand over the entrance. One parasite was timed to wait half an hour before the sericophorine emerged to depart on another hunting expedition.

The parasite then quickly entered and descended the shaft. She remained below for several minutes before re-emerging, and when she did come out, "licked her chops" several times, and then engaged in a general clean-up, repeatedly drawing her legs over her wings and back as though brushing off the last specks of dust. The performance was continued for five minutes.

On several occasions the parasite attempted to descend other shafts, but hastily retreated, having ascertained, probably by scent, that the moment was inopportune for the execution of her fell task. Perhaps she detected vibrations from the huntress down below.

At another time it was noted that a sericophorine flew within a quarter of an inch of the skulking marauder, but there was no evident reaction on the part of either insect. On one occasion the nyssonid parasite drew back nervously, as though in a state of tension, and poised herself alertly, giving one the impression of a cat awaiting the psychological moment to spring on a bird. At that moment a sericophorine departed from the shaft, and the parasite literally hurled herself down the crater. It was also observed that not infrequently the small parasite appeared to experience some difficulty in emerging from the shaft, and now and then even fell back into it, but closer investigation with a magnifying glass revealed that the parasitic wasp was actually engaged in pushing sand back into the aperture, as though attempting to seal it.

It would be logical to postulate that the parasite's action could be the vestiges of the fossorial instinct to close a cell after the depositing of the egg. On the other hand, it may possibly be argued that the closing of the she shaft would mislead the sericophorine hostess, on her return, into regarding the shaft as being completed and sealed, and thus refrain from disturbing the status quo on discovering the foreign egg in place of her own. The first postulate is, perhaps, the sounder one.

An isolated sericophorine shaft was excavated during the day, and it was ascertained that several cell-chambers were present, so that the architecture is unlike that of *S. teliferopodus,* which conforms with the typical dichotomous pair (see Memoirs National Museum, Victoria, No. 19, pp. 11-105, 1955), and follows the pattern of *S. chalybaeus* Sm., which was illustrated in the Australian Zoologist, Vol. xii, Pt. 2, July, 1955.

Number 1 cell contained three male flies; No. 2 cell four male flies; No. 3 cell four male flies. The first fly brought in receives the egg of the hunting wasp, but in each of the cells investigated the egg of the sericophorine had been slashed or devoured by the paratisic nyssonid, that had then selected a spot on the sternal surface of the second fly, immediately between the coxae of the median and posterior legs of the right side, and deposited her own egg there.

The elongate white egg of the nyssonid parasite measured 1,000 microns at its long and 310 microns at its short axis. It was only very slightly bowed, and showed little or no sculpture on the chorion. There was some slight elongation of the egg when segmentation of the larva became apparent.

In other wasp shells excavated by this observer there were present neither nyssonid nor sericophorine larvae, but it was demonstrated later that both had been devoured by numbers of larvae of a minute long-legged blackish fly in the genus *Ephydroscinus,* and, as it is new to science, the specific description is appended.

The senior author had already obtained another closely-related species, *Ephydroscinus raymenti* Curran, from the "nests" of a fossorial bee, *Halictus raymenti* Ckll. (see A Cluster of Bees, p. 245, 1935.), and other closely-related chloralictine bees. The behaviour is alike, for both small parasites skulk about the entrance until the industrious hostess departs for the field; the parasites then dash quickly down the shaft, deposit an egg, and as quickly retreat to the surface, hence the necessity for their very long legs to cover the distance rapidly before the hostess returns.

All nature-lovers should read Fabre's inimitable account of "The Gnat" that is parasitic on certain French bees, not only for its good observations but for the beauty of the language. The essay will also serve to illustrate a European parallel with our own species of minute dipteron.

These microscopic flies had often been observed frequenting the vicinity of the sericophorine shafts, but their incidence on the biology of the sericophorines was unknown. However, on 18th March, 1956, an average of 30 small puparia were obtained from certain cells. They were of two sizes, the larger ones being reddish-brown, measuring 4.25 mm. in length, with a diameter of .80 mm., but the smaller ones were yellowish-amber, being 2.50 mm. in length, with a diameter of .62 mm. It is presumed that females issued from the larger puparia and males from the smaller. Most of the tiny dipterons had emerged by the 1st April, 1956.

It would appear, from the senior author's researches, that with one or two exceptions each species of *Sericophorus* normally confines its attacks to one species of Diptera, but should that supply deteriorate from any cause, then a closely-related fly will be captured. There is no doubt of the sericophorines' ability to distinguish one species of fly from another.

No copulation of the sexes was observed in either of the wasps, and the time spent in hunting and capturing a fly varied considerably, the shortest time was one and a half minutes, and the longest 30 minutes, but there is little doubt that, during this last period, the wasp refreshed herself at the flowers.

The female of *S. victoriensis* Raym.* hunts her prey later than *S. teliferopodus* Raym. does, and it was interesting to confirm the senior author's conclusions that the wasp will attack other species of Diptera when the normal supply of specific food is curtailed from any cause. As the biology has been dealt with rather comprehensively in the Australian Zoologist, 1955, it would be redundant to repeat it here.

Family CHLOROPIDAE.

Genus EPHYDROSCINIS Malloch, 1924.

EPHYDROSCINIS PROXIMA, sp. nov.

A minute, blackish, long-legged parasitic fly, measuring not quite 2 mm. in length, and closely related to *E. raymenti* Curran.

The new species may be separated from *E. raymenti* by the pattern of the peculiar metallic silvery-green sheen on the dorsal surface of the thorax, which is divided by three black longitudinal lines; posteriorly the lines gradually converge, leaving a large green macula laterally, in the centre of which is a black dot, and a coarse lateral scutellar bristle. Scutellum very elevated.

The pleural region is exceedingly silvery, and so is the gena of the head. The black abdomen is even smaller than that of *E. raymenti,* and the blacker legs are a trifle shorter, with the anterior tibiae very different, being angulated basally. Two distal segments of all tarsi are jet-black.

The neuration of the wings is black (amber in *E. raymenti*), and in the marginal and submarginal cells is a blackish long-oval mark (suffused light band extending over three cells in *E. raymenti*).

The chaetotaxy could not be studied critically, but it would appear to be very similar to that of *E. raymenti,* although there is a very strong pleural bristle on the new fly, and four dorso-centrals.

Locality: Mt. Richmond, Victoria, 18th March, 1956, leg. Clifford Beauglehole.

Bred from puparia taken from the cells of *Sericophorus victoriensis* Raym.

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* The prey of *Sericophorus victoriensis* is almost certainly the male tachinid fly, *Austrodexia communis* Mall. in the subfamily Dexiinae, Family Tachinidae.

EXPLANATION OF PLATE.

1. Lateral view of minute fly, hyperparasite *Ephydroscinis proxima* Raym.
2. Pattern of black lines on dorsal surface of thorax.
3. Arista is minutely plumose.
4. White antisquame.
5. Two apical segments of fly are black, and the claws simple.
6. Squame.
7. Cluster of puparia of fly in cell of *Sericophorus victoriensis* Raym.

8-9. Puparia of fly enlarged.

10. Basal end of puparia enlarged to show tubercles.
11. Surface of wing of fly is densely covered with microscopic hair.
12. Ventral surface of the bristly prey, showing position of the sericophorine egg.
13. Ventral surface of the bristly prey show the position of the nysonnid egg between the median and posterior coxae.
14. View of the underneath of the head of the prey.
15. Chaetotaxy of the buccal region enlarged.
16. Shaft of *Sericophorus victoriensis* Raym.
17. Tumulus at entrance.
18. Cells of *Sericophorus* were disposed in a radial pattern: a, b, c, d, e, and f, positions of the cells.
19. Black excremental scale in base of wasp cell.
20. Second abdominal tergite of prey, showing the main bristles on a median ridge.